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SEDIMENTS

Date:
August 20, 2010

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Our ref:
B0064536.00675

Subject:
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Multi-Area Health and Safety Plan Addendum 7: Potential Contact with Harmful Algal Blooms

Dear Mr. Borries, Ms. Kirby-Miles, and Mr. Karl:

On behalf of Georgia-Pacific LLC (Georgia-Pacific), please find enclosed Addendum 7 (Addendum) of the Multi-Area Health and Safety Plan (HSP) (Rev. 1).

Sincerely,

ARCADIS

Stephen Garbaciak Jr., P.E.
Vice President

Copies:
James Saric, USEPA
Garry Griffith, Georgia-Pacific Corporation, LLC.
L. Chase Fortenberry, Georgia-Pacific Corporation, LLC.
Michael J. Erickson, P.E., ARCADIS
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Allied Paper, Inc./Portage Creek/
Kalamazoo River Superfund Site

Supplemental Remedial Investigations/
Feasibility Studies

Multi-Area Health and Safety Plan:

Addendum 7, Potential Contact with Harmful Algal Blooms

Georgia-Pacific LLC

August 2010

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Multi-Area Health and Safety Plan: Addendum 7, Potential Contact with Harmful Algal Blooms

Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site

Supplemental Remedial Investigations/Feasibility Studies

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Georgia-Pacific LLC

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1. Potential Contact with Harmful Algal Blooms

At the Allied Paper, Inc./ Portage Creek/Kalamazoo River Superfund Site (the Site), ARCADIS personnel perform a variety of activities that may result in contact with surface water – these include collecting sediment or surface water samples, surveying river banks or the river bottom, monitoring surface water conditions, carrying out construction work, and other tasks . The presence of Harmful Algal Blooms (HABs) within bodies of water, particularly those in a stagnant or slow-moving condition, may constitute a potential hazard to those individuals who are members of field crews at the Site.

ARCADIS personnel must be aware of the existence and appearance of HABs, the concerns and risks associated with exposure to HABs, and the health and safety precautions that should be implemented to avoid exposure to HABs. This addendum to the *Allied Paper, Inc./Portage Creek/Kalamazoo River Multi-Area Health and Safety Plan* (ARCADIS BBL 2007) was developed to describe the potential hazards associated with HABs and measures that should be taken to mitigate those hazards.

1.1 Hazards

HABs consist of various single-celled organisms living in water including algae and dinoflagellates. HABs are technically cyanobacteria that are capable of photosynthesizing. When certain environmental conditions are present, such as (1) shallow, warm, calm water; (2) excess nutrients; (3) low-water or low-flow conditions; and (4) high sunlight levels, these organisms can rapidly multiply. The resulting dense population of algae is buoyant and tends to float to the surface, where it forms scum layers or floating mats. Due to wind conditions, they tend to accumulate in the shallow portions of bodies of water (Michigan Department of Natural Resources and Environment [MDNRE] 2010). The blooms may appear blue, bright green, brown, or red and may look like paint floating on the water. Some blooms, however, may not result in the change of the appearance of the water.

HABs, which are often referred to as "blue-green algae blooms," can be confused with Cladophora, a green algae, because both can create wide-spread blooms. However, not all blooms or surface scums are harmful. True algae like Cladophora do not generate the toxins associated with HABs. Blooms of Cladophora produce "muck" zones on beaches and lake shores and may potentially harbor bacteria, but they do not produce harmful algal toxins. In contrast, the cyanobacteria that cause HABs are capable of producing a variety of toxins, and it is the exposure to the toxins that poses potential health risks. True algal blooms and HABs also look and behave differently – HABs tend to stay in water column while Cladophora wash up on shore in mats. When HABs die, they sink to the bottom while Cladophora float to the

surface. HABs also appear smaller than Cladophora, which can grow up to three feet long and appear filamentous and branched. HABs, however, form visible colonies.

A HAB on the shore of Catawaba Island, OH. Photo by NOAA 2009.

A Cladophora bloom on the shore of Lake Erie. Photo by Scott Higgins 2006.

The primary physical hazards associated with contact with HABs are ingestion and dermal exposure during sampling, surveying, monitoring, or construction activities that may require substantial contact with water in which bloom may be present. Reactions vary depending on each individual's sensitivity to the HABs, but can include numbness of lips, tingling in fingers and toes, headache, rash or skin irritation, abdominal pain, diarrhea and vomiting, and even cardiac arrest or respiratory failure. These reactions are caused by a wide array of neurotoxins and liver toxins that are harmful to humans. Types of toxins that can be produced in HABs and associated effects are detailed below (Wisconsin Department of Natural Resources, 2009):

- **Dermatotoxins and Gastrointestinal Toxins**—These could cause allergic-type reactions such as rashes, eye/nose/throat irritation, and asthma, as well as headaches, fever, and gastroenteritis (nausea, stomach cramps, vomiting, diarrhea).
- **Hepatotoxins**—These are liver toxins and can cause gastrointestinal distress, tissue damage, muscle weakness, paralysis, and respiratory failure (with acute exposure), tumors, and possibly liver cancer (with long-term, chronic exposure).
- **Cytotoxins**—These toxins can cause malaise, headache, vomiting, chromosome loss, DNA strand breakage, and damage to organs.

- **Neurotoxins**—These toxins affect the central nervous system and can cause seizures, paralysis, respiratory failure or cardiac arrest.

1.2 Controls

ARCADIS employees who work on or near water may potentially be exposed to the HAB hazards. Hazards can be controlled or minimized if precautions are observed and appropriate procedures are followed to prevent or minimize contact with water that may contain HABs.

Presence of HABs may be apparent most of the time, but some blooms may not affect the appearance of the water. If surface scums are observed and an earthy or musty smell is detected, a water sample should be collected from the area and tested to confirm or disprove the presence of toxins. If an HAB with toxins is confirmed, personnel should not treat affected surface waters with any herbicide or algaecide, as toxins could possibly be released into the water when the algae die. If possible, dermal contact with waters positively identified to contain HABs should be avoided.

As a precautionary measure, personnel should avoid water contact in areas where foam or mats of algae are present in the water regardless of whether the organism is cyanobacteria, Cladophora, or any other algae. A more dense population in the bloom/mat and a longer and increased exposure will cause more severe reactions. Wearing of wet suits may not effectively protect the personnel from contact with the HAB and may in fact aggravate a potential reaction if cyanobacterial material accumulate at the cuff and collar areas and the cells rub against the skin.

If sample collection requires contact with water in areas where a bloom is confirmed present, ARCADIS personnel should try to minimize physical contact with the water. Personnel should immediately remove all contaminated clothing, including footwear, and shower or rinse off thoroughly after exiting the water, and clean all equipment after use. In addition, personnel should wear impermeable gloves, a long sleeved shirt, pants, eye protection, coveralls and waders, if necessary. Prior to use, waders must be inspected for holes, punctures, or any other defect that may allow water to enter the waders and expose the personnel to contact with HABs. Defective Personal Protection Equipment (PPE) should be tagged "DO NOT USE" and removed from service.

Setting up a rinse stations near the sampling area should be considered. Personnel should immediately vacate the area and seek medical attention if signs of illness are observed.

Ingestion of water containing HABs should also be prevented. Personnel are required to wear Personal Floatation Devices (PFD) to keep afloat in the event of capsizing or being thrown overboard.

1.3 Job Loss Analysis

A Job Loss Analysis (JLA) is a tool used to identify potential hazards and develop corrective or protective systems to eliminate the hazard. A JLA for potential exposure to HABs was prepared as part of the development of this addendum and is included as Appendix A.

1.4 References

ARCADIS BBL. 2007. *Allied Paper, Inc./Portage Creek/Kalamazoo River Multi-Area Health and Safety Plan – Revision 1.* Prepared for the Kalamazoo River Study Group. May 2007.

Higgins, S. 2006. Photograph of Cladophora bloom at Rock Point Provincial Park, Lake Erie. June 2006. Accessed online at https://mywebspace.wisc.edu/snhiggins/web/research.htm July 9, 2010.

MDNRE. 2010. *HAB Fact Sheet,* June 2010

NOAA, 2009. Photograph of harmful algae bloom. Accessed online July 9, 2010. http://www.noaanews.noaa.gov/stories2009/20090917_ohiohab.html

Wisconsin Department of Natural Resources. *Blue-Green Algae in Wisconsin Waters,* December 2009

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Appendix A

APPENDIX A

Job Loss Analysis

General

Client Name KALAMAZOO RIVER STUDY GROUP

JSA ID 2850

Job Name Environmental-Other

Task Description surface water monitoring, collecting of water samples, sediment sampling, surveying, construction and other activities

Project Number B00645240001

Project Name KALAMAZOO-SITEWIDE

PIC Name DESHIELDS, BRIDGETTE

Project Manager COWIN, DOUGLAS

Status Name (4) Revise

Creation Date 6/21/2010 12:58:16 PM

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
Created By	Galicinao, Gregory-Albert	7/20/2010			Amber, Danielle	True
Developer (Primary Contact)	Galicinao, Gregory-Albert	7/20/2010			Amber, Danielle	True
HASP Reviewer	Edwards, Lauren				Coppola, Mija	True
Reviewer	Amber, Danielle				Barry, Jeffrey	True

Job Steps

Job Step	Job Step Description		Potential Hazard	Critical Action	HSP Reference
1	surface water monitoring, collecting of water samples, sediment sampling, surveying, construction and other activities that may require contact with stagnant water	1	Dermal Exposure to water during water sampling and monitoring; sediment sampling, surveying, construction and other activities- potential contact with harmful algal blooms (HABs)	Wear impermeable gloves; long sleeved clothing and waders	
		2	Water entering boots may increase dermal contact with HABs (and other water-borne irritants)	Wear rubber outer boots when appropriate. Waders should be worn when wading into deeper water.	
		3	Falling into stagnant water that can cause ingestion of water containing HABs	Wear PFD. This will keep the person afloat and minimize ingestion of HABs within water.	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Dermal Protection	coveralls		Required
Dermal Protection	long sleeve shirt/pants		Required
Eye Protection	safety glasses		Required
Foot Protection	rubber boots		Required
Hand Protection	chemical resistant gloves (specify type)	water-impermeable gloves	Required
Miscellaneous PPE	personal flotation device	Type III per SSO	Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Decontamination	Decon supplies (specify type)	Skin-washing facilities	Required
Personal	eye wash (specify type)	bottle	Required